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SOCIETY PROCEEDINGS

THE HELMINTHOLOGICAL SOCIETY OF WASHINGTON

The thirty-ninth meeting of the society was held January 9, 1920. Messrs. Boeck, Cort, Daubney, Hegner, Root, Scott and Taliaferro were elected active members. Dr. J. E. Guberlet and Dr. G. A. MacCallum were elected American corresponding members and Dr. S. Yokogawa and Dr. S. Yoshida were elected foreign corresponding members.

The following note was presented by Dr. Cobb:

NOTES ON TYLENCHUS PENETRANS AND T. DEVASTATRIX

In shipments of lily-of-the-valley bulbs from Holland, the roots show discolored areas, which on examination prove to be heavily infested with what the authorities in Holland have regarded as *T. pratensis* deMan, but which has been found to be *T. penetrans* Cobb. This pest is so common on these bulbs in Holland that the Dutch authorities have notified American authorities that they can not guarantee freedom from it. German bulbs are similarly affected.

This has raised the question as to the degree of prevalence of the parasite in this country. It has been found on roots of potatoes, cotton, violets, and camphor. Around Washington, D. C., and adjacent states, lily-of-the-valley bulbs are free from this, but harbor 19 other nemas.

In this connection it may be noted that in a shipment of about 15 species of plants from Brazil, there were found in a few ounces of attached soil 76 species of nemas belonging to 30 genera, of which species 75 per cent were new. In soil from the roots of one species of plant from Guatemala there were 23 species of nemas, of which 61 per cent were new. In bamboo from Japan, grown in South Carolina, there were eight species of nemas, of which 75 per cent were new. In dirt ballast from Trieste, Italy, 14 species of nemas were found, 79 per cent of which were new.

Red clover raising in the North-west has been seriously interfered with by the injury resulting from infestations with *Tylenchus dipsaci* Kühn (*T. devastatrix*), probably imported from Holland on hyacinth bulbs. This species also occurs on the onion. In Idaho it has done so much damage that it has been necessary to plow out second-year clover, thus occasioning considerable loss. An investigation shows that the live nemas may occur on the seed even when recleaned. As this species has been worked on by Ritzema Bos, an inquiry was sent to him in regard to the present knowledge of resuscitation of the worm. In reply he states that the eggs and larvae survive after desiccation for varying periods. In some stages the worm will survive after desiccation for 6 days; in others after desiccation for 2½ years. The worms are best revived in a well aerated film of water and may require from a number of hours to two weeks to again show signs of life. This is probably true of many soil nemas, a point of interest in connection with the wide distribution of these worms in commerce. Dr. Cobb stated his belief that the above incidents are a reliable indication of the extent to which nemas are distributed in ordinary commerce.

Dr. Cort presented the following note:

A PECULIAR MODIFICATION OF THE TAIL IN A CERCARIA

A number of theories undertake to explain the morphology of the cercaria tail. It has been surmised that the tail serves as bait for the host animal in cases where the tails resemble annelids belonging to the Tubificadae in their general outline and movement. The tail also serves in locomotion and attachment, and possibly in floating and in some instances forms a cyst for the body of the worm. In a form found in California the interpretation of the tail structure is very difficult. In the case of a similar form described by Ssinitzin, this writer has suggested that the tail serves to hold the cercaria in place in the host. An examination of the curiously modified tail in the California specimens shows that the tail appendages are connected with the excretory system and that the tail has only a weak attachment to the body, pulling loose very soon after escaping from the redia. In this species the tail could not function as a cyst, as the tail bulb has too small an aperture connecting it with the body. There are two ribbon-like processes of unknown function extending from the back, and a very long process connecting with the excretory system.

Dr. Stiles gave a very interesting talk on his experiences during the war, including helminthological work and other activities.

The fortieth meeting of the society was held February 20, 1920.

Doctor Ransom presented the following note:

INTESTINAL LESIONS IN CALVES DUE TO COOPERIA PUNCTATA

Post mortem examination of calves dying during the late autumn and early winter at the Experiment Station of the U. S. Bureau of Animal Industry at Bethesda, Maryland, disclosed the presence of heavy infestations with several species of nematodes, including lungworms, stomach worms, hookworms and a small trichostrongylid, *Cooperia punctata.* The last-named species occurs in the stomach and intestine and has been found in cattle in Europe as well as in the United States. The adult worms have been reported as occurring in the lumen of the digestive tract, but in this outbreak of disease at Bethesda it was found that they also occurred in the intestinal mucosa of the upper part of the small intestine. In the mucosa they are present in lesions which are visible to the naked eye as small accumulations of white or yellow caseous material. The same type of lesion associated with small worms, which in all probability are the same species, has been reported from calves in Mississippi and Louisiana by veterinarians in those states in verbal communications. Specimens of worms from apparently similar cases have been sent in from Venezuela by Doctor Ribero. In this material the worms are somewhat larger and more robust as a whole and in detail, the spicules attaining a maximum length of 175μ as compared with 150 to 155μ in worms collected in this country and in Europe, but the species is apparently identical. *C. punctata* is commonly associated with *Cooperia oncophora* in the intestinal lumen, the former being most numerous in the upper part of the small intestine and scarce in the lower part, the latter on the other hand being rare in the upper part and more numerous in the lower part of the small intestine. In this connection it may be noted that the young hookworms found in calves at Bethesda occurred in the lower part of the small intestine, whereas the mature worms were most numerous in the upper part of the small intestine. It is also of interest that in a number of cases hookworms were present in the fourth stomach as well as in the small intestine.

Doctor Cort exhibited a specimen of *Taenia saginata* in which one segment showed a genital papilla on each margin, the male tubules being apparently complete on both sides and the female tubules being complete and apparently functional on one side only, the other side presenting only a vaginal rudiment at the margin, which did not connect with the oviduct. The discussion of this tapeworm, a species which abounds in abnormalities, brought out other reports of similar variations and a consideration of some of the species which have been based on abnormal specimens of *T. saginata.*

Doctor Cort called attention to the fact that the Japanese government is sending 80 men each year to other countries for study and investigation, and that among these men this year there are five parasitologists, Yokogawa, Yoshida, Miyagawa, Miyauri and Goto, of whom the first two are in the United States.

Doctor Yokogawa exhibited some drawings of a Heligmosomum from the rat, *Epimys norvegicus,* in Baltimore. The species is of special interest on account of a marked asymmetry of the bursa. The discussion of this worm brought out a number of points in connection with asymmetry in nematodes and other animals, among others the asymmetry of the head in the louse, Philopterus, and of the bursa in Haemonchus and Bunostomum.

Doctor Pfender gave a discussion of oral infections and the possible relation of amebae to these infections.

Mr. Schwartz presented the following note:

ACTIVE SUBSTANCES IN MACRACANTHORHYNCHUS

Physiologically active substances that are known to occur in parasitic worms may be conveniently grouped under the headings (1) enzymes, (2) hemotoxins, (3) toxic substances which have been designated as leucomains by certain writers, but which are more commonly referred to as teniotoxins, askaron, etc., depending upon the group of worms in which they occur. Tests for the presence of enzymes in *Macracanthorhynchus hirudinaceus* (*-Gigantorhynchus hirudinaceus*) were performed on the fluid which occurs in the general cavity of the worm, on watery extracts of the entire body substance of the worm and on the fraction of the worm that is precipitated by absolute alcohol. The results were identical in each case. Neutral olive oil was not digested by the fluid of Macracanthorhynchus after a week's incubation at 37 to 38° C. Protein material such as coagulated egg albumin and fibrin stained with Congo red, showed evidence of digestion by the fluid Macracanthorhynchus by setting free the stain which colored the solution after 24 hours at 37 to 38° C. The weak proteolytic action of the fluid was observed in an alkaline medium and was completely inhibited in an acid medium. Small shreds of fibrin were not dissolved after being in contact with an alkaline solution of the fluid for a week. Proteolysis by Macracanthorhynchus fluid is therefore a markedly slow process. In contrast to the feeble digestion of proteins, digestion of starch occurred quite rapidly. Starch paste, boiled and unboiled potato starch, were converted into sugar by the fluids of the parasite. Tests for the presence of oxidizing enzymes were negative. Hydrogen peroxide remained intact after the addition of Macracanthorhynchus fluid. A tincture of guaiac was similarly unaffected, even in the presence of a weak solution of hydrogen peroxide.

Concerning the presence of hemotoxins in Macracanthorhynchus, a limited series of experiments have yielded positive results. The fluid from the general cavity of the worms was found to be hemolytic to washed red blood corpuscles of cattle and swine. Dried worm material was powdered and extracted in physiological salt solution. The opalescent supernatant fluid was tested on washed rabbit blood corpuscles with the following results. After one to two hours' incubation the corpuscles became agglutinated but not hemolyzed. Eighteen hours later, during which interval the tubes containing the mixtures of corpuscles and worm fluid were kept at 8° C., hemolysis had occurred. In the presence of normal rabbit blood serum the hemolytic potency of the extract was paralyzed. The potency of the extract was destroyed by boiling. Tests on sheep erythrocytes yielded negative results.

Doctor Cobb exhibited some apparatus useful in the collection of parasites, including (1) screens in which the intersections of the mesh are welded to make an integral construction strong enough to permit of the use of large screens, without the resultant distortion which occurs in ordinary woven mesh; and (2) a Syracuse watch glass painted black on the bottom and graduated on the bottom inside, to facilitate collection by giving a contrasting background.

The forty-first meeting of the society was held March 20, 1920.

Dr. Hall presented a note on intestinal parasites found in 18 Alaskan foxes from St. George Island; all had ascarids, ten had a very small species of

Mesocestoides, apparently new, one had an undetermined species of Taenia, a very small worm, and one had a number of dipterous larvae, probably from fly-blown flesh. None of the foxes had hookworms, which are a serious pest in some places. In comment, Dr. Cort noted the presence of a small Mesocestoides in the mouse in Colorado and a Mesocestoides from the coyote in California.

Dr. Hall also presented a short note on anthelmintics, covering two points: 1. That where oil of chenopodium is followed after an hour or longer by a purgative, Epsom salts may be superior to castor oil in that salts usually cause purgation more rapidly than does castor oil, but that where purgatives are given with the oil of chenopodium, castor oil is quite satisfactory and seems, in some cases, to have given protection of some sort apart from its purgative action; 2. That tests of anthelmintics on earthworms are only tests of toxicity for the substances tested and that the results are, for the most part, only applicable to earthworms. Tests in vitro even on parasitic worms tell little about the anthelmintic value of the drugs tested. Even the application of results obtained in administering anthelmintics to remove worms from one species of animal must be made with reserve to other species which are infested with closely related worms.

Dr. Ransom presented the following note:

THE OCCURRENCE OF ONCOCERCA IN CATTLE IN THE UNITED STATES

About ten species of Oncocerca have been reported from man and the domesticated animals. The life history of none of these has been worked out. *O. reticulata* occurs in the suspensory ligaments, flexor tendons and other connective tissues of the legs of the horse, and *O. cervicalis* in the cervical ligament of the same host. *O. volvulus* occurs in man in Africa, in nodules in the subcutaneous connective tissue usually on the body, rarely on the hand. *O. caecutiens* Brumpt, 1919, which occurs as a parasite of man on the west coast of Guatemala, is very similar to *O. volvulus,* but is located practically always on the head. It causes a disease known as coast erysipelas. Robles has operated on over a thousand cases with almost invariably prompt relief to the patient following the removal of the parasites. *O. gibsoni* occurs in cattle in Australia, usually on the brisket, and is of considerable importance in meat inspection with especial reference to the export beef trade. This species is quite certainly absent from the United States.

In the United States, either *O. reticulata* or *O. cervicalis,* and probably both, occur in the horse, and *O. lienalis* (Stiles, 1892) in the gastro-splenic ligament of cattle, the last named being common and widely distributed. There has also been found in cattle in this country, a species which occurs in a superficial position in the ligamentum nuchae and in the ligaments of the legs, especially at the knees. This form seems rather common in cattle slaughtered at Chicago. The lesions produced are slight, consisting of small local edemas and discolorations in the connective tissue and sometimes calcareous concretions in cases in which the parasites have degenerated. This parasite is of comparatively little importance in meat inspection; the species remains to be determined.

Dr. Simon reported the occurrence of an Oxyuris in the Canadian porcupine. The discussion developed the fact that this worm is probably *O. evoluta* which was described from the porcupine.

Mr. Schwartz presented the following note:

ANTIBODY PRODUCTION BY ASCARIDS

According to certain investigators, tests by the Abderhalden reaction are positive for animals known to be infested and negative for noninfested animals, but too much stress can not be laid on this fact in view of what has been learned of this reaction. Tests by complement fixation reaction on 17 hogs, showed 16 negative and 1 positive. Fecal examinations of the same animals showed 10 uninfested and 7 infested. The positive reactor showed infestation. In this connection it should be noted that eosinophilia is infrequent in ascariasis. This fact and the failure of infested animals to show a positive reaction by complement fixation indicate that absorption of substances derived from or elaborated by ascarids is inconstant, the conditions determining the absorption being unknown. When rabbits are immunized with material from *Ascaris lumbricoides,* they show a positive complement fixation, indicating the production of antibodies. The reaction is not strictly specific, since it can be worked by antigen prepared from *Ascaris equorum.* The antigen must be kept cool and used fresh, which indicates that it is very unstable.

Dr. Ransom called attention to serum sickness occurring in his own case from the entrance of a minute amount of ascarid fluid into an abrasion on the hand. There was a prompt local reaction, rapidly extending, followed by general urticaria, slight dyspnea, pulse of 150, swelling of arms and face, and an increase of polymorphonuclears in an hour to 80 per cent.

Dr. Hassall discussed the question as to what constitutes a legitimate place of publication for scientific names. This matter is of importance since the application of the law of priority depends largely on it. The place of publication should be as legitimate as the name published.

Mr. Chapin exhibited some specimens of wasps parasitized by members of the Stylopidae (or Strepsiptera). Among these forms, the female is a permanent parasite of the wasp's abdomen. Wasps become infected as larvae, the female Stylops remaining on the wasp, while the male leaves in the spring. Wasps attack and destroy these males whenever possible and it is advisable in breeding experiments to have a partitioned cage with a screen through which the Stylops can pass and the wasp can not. The male Stylops seeks out the unfertilized female and copulates on the wasp, the female later swelling to form a bag of eggs. The resultant larvae swarm out and collect on flowers or other places where they can attach to suitable host insects. These insects carry the larval parasites to their nests, where they feed on the cell food and mature. The parasitized wasp shows pronounced changes as a result of the infestation.

Dr. Hegner presented a note on "Measurement of trypanosomes of the newt, *Diemyctylus viridescens*" (To be published in THE JOURNAL).

Dr. Scott presented the following note:

INSECTS AS POSSIBLE HOSTS OF SARCOCYSTIS TENELLA

In view of the fact that a connection had been suggested by Darling between the Cnidosporidia of the insects and the mammalian sarcocysts, a number of experiments with lambs were carried out in Wyoming to obtain information on this point. Lambs were fed numerous insects belonging to various orders and exposed in other ways to possible infection by insects. Check animals were protected from such exposure. In all cases the experiments, which were carried on for four years, gave no evidence in support of the idea that sarcosporidiosis could be associated with insects, and by raising lambs which became infected in a screen cage free from insects the hypothesis was proved untenable.

The forty-second meeting of the society was held May 8, 1920.

Dr. Cobb presented a note on "A newly discovered parasitic nematode (*Tylenchus mahogani,* n. sp.), connected with a disease of the mahogany trees" (published in THE JOURNAL).

He also discussed "The transference of Mononchs from place to place for economic purposes" (published in *Science*).

Dr. Cobb summarized a paper to be published in Nematology, dealing with the morphology of 120 new genera of free-living nematodes.

Dr. Scott presented the following note:

THE OVER-WINTERING OF THE HOUSE FLY IN WYOMING

At Laramie, Wyoming, situated at an elevation of 7,000 feet, the summers are short and the winters long and often severe. To ascertain the possibility of fly larvae or pupae over-wintering under these conditions, a feed rack in which flies were breeding abundantly in the fall was enclosed in a fly-proof cage and examined from time to time during the winter and in the spring. No flies emerged in this cage. It therefore appears that flies can not survive outdoor winter temperature in Laramie while in their larval or pupal stages. It is possible that through trains bring in flies in summer. In the discussion a general belief appeared that the warmer parts of the Southern United States probably acted as a reservoir for a fly supply during the winter and that a large number of flies must be carried North by through trains in spring and summer. Captain Daubney noted that in Mesopotamia flies disappeared during the middle of the summer, apparently owing to the intense heat. He also noted that in one case where flies became very abundant an examination developed the fact that they were breeding in enormous numbers in the horse manure which was being burned. This manure was burned on an elevated screen, after being mixed with straw, and although the manure was burning at the top, the lower layer was swarming with maggots of the so-called "camp fly" (*Musca humilis*).

Dr. Hall presented the following note:

APPARENT ATROPHY OF SPICULES ASSOCIATED WITH INCREASINGLY CLOSE AND PERMANENT UNION OF THE MALE AND FEMALE SYNGAMUS

According to the descriptions of Muehlig and Feuereisen, in *S. bronchialis* of water fowl the union of male and female is not as close or permanent in nature as in *S. trachealis;* the worms are sometimes found separated and it is possible to detach the male from the female without damaging the specimen. In the common tapeworm of poultry, *S. trachealis,* the union is more intimate and permanent; except in the case of young worms in the lungs, males and females are always found attached and it is impossible to pull the worms apart without damaging them. The bursa in this species is small and the spicules are from 60 to 140μ long; appear to be rudimentary. In the Y-worm of cattle, *S. laryngeus,* the union of the male and female is very intimate and the worms can only be detached by tearing one or the other. The bursa is very short and very thick, and the recent work of Sheather and Shilston shows that the bursa of the male is attached to the circumvulvar region of the female by the interlocking of a number of villous projections from the female inserted into crypts in the ventral surface of the bursa. No evidence of a spicule is found even in sections.

The foregoing suggests that with the development of the permanent copula there has been a strengthening of the bursal attachment and, apparently, a simultaneous atrophy of the spicules, terminating in their disappearance in *S. laryngeus* where the bursal attachment is unusually intimate. In comment, Dr. Cobb stated that an increase in the size of the bursa in species of Rhabditis is associated with a diminution in the size of the spicules.

Mr. Schwartz presented the following note:

EFFECTS OF X-RAYS ON TRICHINAE

Encysted trichinae are highly resistant to X-ray radiation. Heavy dosages exert a selective injurious action on the sex cells of the parasites. Twelve days after feeding trichinous meat which had been exposed to heavy dosages of X-rays adult worms were found in the intestines of rats. The worms showed atrophied gonads, and in the females the receptaculum seminis contained no spermatozoa. After very heavy dosages of X-rays the worms died in the intestines of the rat without reaching sexual maturity. Attention was called to Tyzzer's experiments on the effects of radium radiation on trichinae. In discussion Dr. Cobb reported that he had tested the effects of X-rays on the gall nematode, *Herterodera radicicola*. In about a dozen tests with various exposures no effect on the nematodes was noted and the galls developed normally.

Dr. Lyon noted the effect of the X-rays in destroying spermatozoa without destroying the testicular secretions. He also called attention to the delayed production of cancer from X-rays in individuals where the cancer developed years after exposures.

The forty-third meeting of the society was held May 29, 1920. Dr. Stiles presented the following note:

RECENT INVESTIGATIONS ON EXCRETA DISPOSAL

The factors involved are those of expense and labor. With this in mind, the Nasik method was tested, this being in use in parts of India. A trench is used and the excreta covered with street sweepings; it has been claimed that these trenches are inoffensive and do not breed flies, and that the excreta are available as manure in a year. The availability of sawdust led to testing this and it was found excellent. Since burying excreta brought them closer to the ground water and removed the surface soil with its bacteria, the excreta were left on the ground surrounded by a box-like container of sawdust and were covered with sawdust. There was no odor, the sawdust would not wash away or blow away and would not burn. This method is only applicable where there is plenty of sawdust, but this is the case in the pine woods region through a large part of the rural section where present conditions are insanitary. It dries on top and hookworm larvae can not come to the surface through it; they probably die in a year. Amebae may live up to about 52 days, possibly longer. Allowing a 4-inch range of capillarity, about 6 inches of sawdust will be sufficient cover. Flies will develop from eggs and larvae in the manure and various birds will eat large numbers of the flies as they emerge. The fly problem is not entirely solved as yet.

Tests with wells and pits show that the transport of bacteria through soil is a question of ground water. Bacteria do not travel through thoroughly dry soil; they apparently travel large distances very rapidly with ground water. Contrary to what has been stated, ground water contains ciliates and flagellates.

Capt. Daubney presented a note on the lungworms, *Dictyocaulus filaria* and *D. viviparus,* reviewing his own work on the life history. Artificial infection of experimental animals was accomplished first by Romanovitch and Slavine and later by Guberlet. Daubney also succeeded in infecting sheep with *D. filaria* and exhibited figures illustrating the stages in the life history. He called attention to the confusion of the larvae of Dictyocaulus with those of Synthetocaulus by some writers. He also noted that the larvae are not as resistant to actual desiccation as some have claimed, and where there is a trace of moisture worms may survive for much longer periods. The larvae ascend a moist surface in dampness or diffused light and descend when exposed to direct sunlight.

Capt. Daubney also read a summary of a study of the lesions due to various species of lungworms, noting that the lesions were different in the case of Synthetocaulus from those in the case of Dictyocaulus.

Mr. Chapin reported the occurrence of encysted *Gongylonema scutatum* in *Aphodius rubeolus,* a new host for the larvae of this worm.

Dr. Scott presented a note in regard to the transmission of swamp fever by means of the nasal secretions. The secretions were taken from infected horses and injected subcutaneously or injected into the nostrils. In both cases the experiment animals developed the disease, thereby demonstrating this method of transfer for the first time. It is possible that insects may carry these secretions from the nostrils of one animal to another.

The forty-fourth meeting was a dinner celebrating the decennium of the Society.

MAURICE C. HALL, Secretary.

NEW HUMAN PARASITES

Necator argentinus Parodi, 1920, is described from Argentine and southern Brazil (Sem. med., Buenos Aires, no. 6, 1920). Langeron (Bull. soc. path. exot., 13: 539) discusses the significance of the cervical papillae in the Ancylostomes and shows that they are not of diagnostic value. He concludes that the Argentine species is probably the same as *Necator americanus* Stiles.

Entamoeba macrohyalina Tibaldi, 1920, was found in the crypts of the tonsils of two young persons in Italy. It measures 24 to 40μ in diameter with a nucleus measuring 3 to 6μ in diameter, and thus tends to be considerably larger than *E. gingivalis* which is of common occurrence in the mouth and may also be found in the tonsils. It differs conspicuously from *E. gingivalis* in the character of its ectoplasm which forms a broad homogeneous zone of a pale opal tint when stained with Giemsa. There is a well developed contractile vacuole evident in the living organism. The nucleus is without a definite membrane and there is no karyosome. The nuclear chromatin abundant, and in the resting condition is disposed in little clumps closely pressed together in the peripheral portion of the nucleus, leaving in the center a small clear triangular or polyhedral area. (Ann. d'Igiene, 30: 613-620, 1 pl., figs. 1-12, Oct., 1920.)